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(56) Documents cited  
GB 2115719 A US 4824642 A US 4779467 A

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Online databases: WPI and CLAIMS

(54) Multichannel pipette

(57) The pipette comprises a casing with end cylindrical members (2) whose lower portions (3) have tapered external surfaces. The pipette includes separable tips (4) fitted in the lower portions (3) of the members (2). The external surface of the members (2) accommodates a strip (5) to remove the tips and which is moveable along the members (2). The lower surface of the strip (5) is adapted to remove the tips and has variable-height projections (7), each of which is disposed opposite each tip (4).

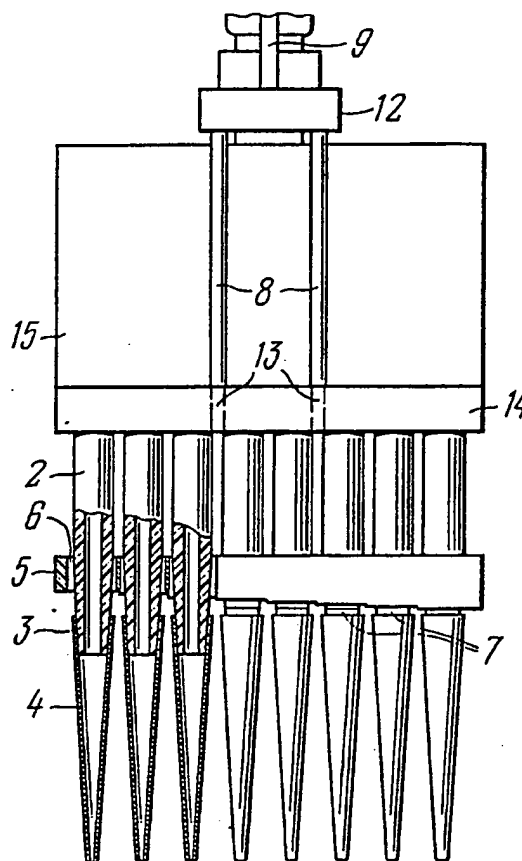
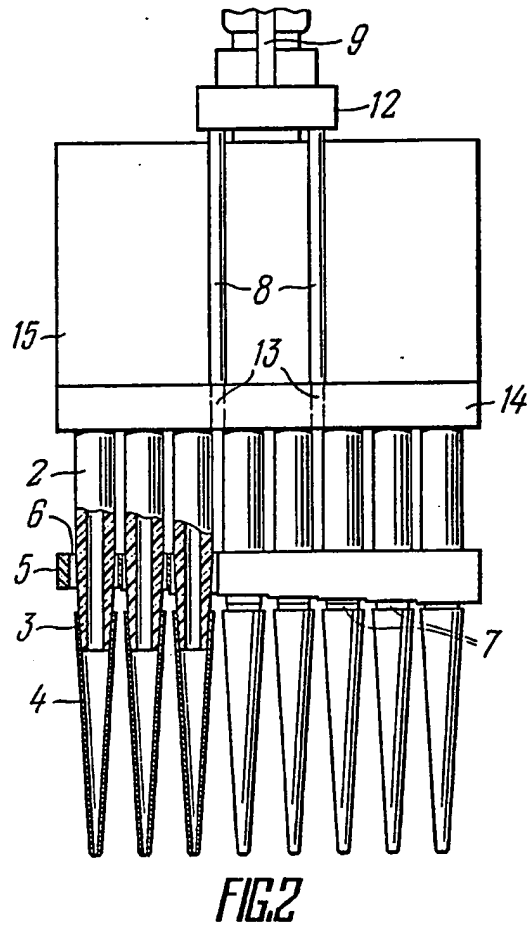
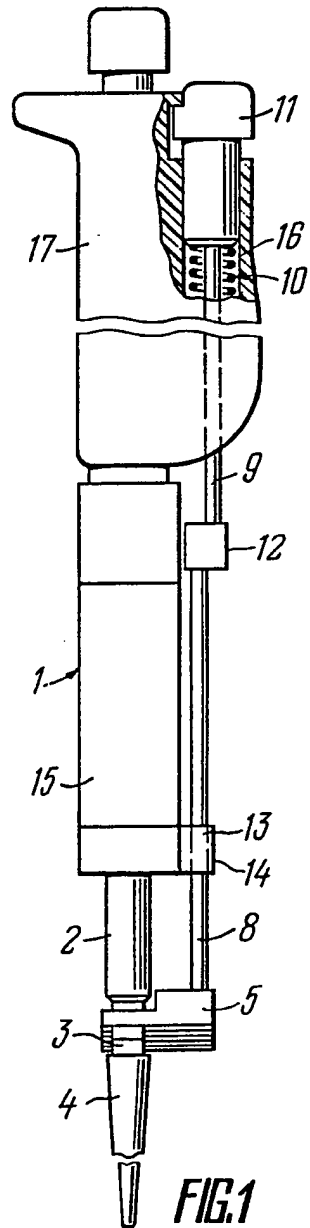


FIG. 2

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# MULTICHANNEL PIPETTE

The present invention relates to facilities for chemical and physical laboratories, more particularly, to multichannel pipettes.

5       The invention may find applications for dosing liquids in biological, chemical and biochemical research and in medicine.

There is widely known a pipette (cf. Flow laboratories, GB, Titerrec Multi-channel Pipettes for Microtitration, No. 77-859-00, 1977) comprising a vertical casing and cylindrical members secured to the lower surface of the casing, the lower portion of the cylindrical members having a tapered external surface. A separable tip is hermetically fitted over the tapered external surface  
10 of each cylindrical member. A strip designed for removing separable tips is installed on the external surface of the cylindrical members in a manner allowing its movement along said cylindrical members. The known pipette also comprises a strip motion drive made as a rod having  
15 its lower end secured to the strip, while its upper end accommodates a button. The strip motion drive rod is spring-loaded and fitted through a hole in a projection provided in the lower portion of the casing.

To remove the separable tips on completion of the  
25 dosing operation when the liquid has been drained from the separable tips, it is necessary to depress the button which compresses the spring and sets in motion the strip through the rod during its downward movement. At the

same time, the lower surface of the strip bears against all the tips, thus causing them to move from the tapered surface of the cylindrical members to a vessel for receiving used separable tips.

The button is released after the separable tips have been removed. Thus, the button moving upwards under the action of the opposing spring sets the strip to the initial position. So, the used separable tips are thrown off without being touched by the operator. However, in the known pipette all the separable tips are thrown off simultaneously and the operator has to apply considerable force to depress the button since each separable tip is hermetically fitted over the tapered external surface of the cylindrical member, the total number of said separable tips being up to twelve.

Furthermore great force applied to throw off the separable tips causes them to leave the tapered surface of the cylindrical members at a high speed whereby drops of the dosed-out liquids remaining in the separable tips will be splashed as said tips strike the bottom of the vessel for receiving used separable tips, a disadvantage causing difficulties in maintenance of the known pipette when corrosive or toxic liquids are dosed out.

According to the present invention there is provided a multi channel pipette comprising a plurality of pipette members, each having means for carrying a separable tip, tip removing means mounted for movement relative to the members for engaging and displacing the tips to remove the tips from said members, the tip removing means being arranged to engage and remove tips successively from respective members upon operation of said tip removing means.

More specifically there is provided a multichannel pipette comprising a casing, cylindrical members secured to one lower end of the casing and having their internal cavity communicating with the internal cavity of the casing, their lower  
5 portion having a tapered external surface, separable tips fitted hermetically in the lower portion of the cylindrical members, and a strip adapted for removing the separable tips and installed on the external surface of the cylindrical members in a manner allowing its  
10 movement along said cylindrical members, in which, according to the invention, the lower surface of the strip adapted for removing the separable tips has variable-height projections, each of which is disposed opposite each separable tip.

15 It is advantageous that, with a view to increasing further convenience in maintenance of the proposed multichannel pipette with the cylindrical members arranged in one row, the height of the projections of the strip adapted for removing the separable tips should change  
20 linearly in the direction from the first to the last separable tip.

The present invention provides for smooth removal of used separable tips due to a novel structural embodiment of the strip adapted for removing the separable  
25 tips, a feature making more convenient maintenance of the multichannel pipette according to the invention.

The invention will now be described further with

reference to a specific embodiment thereof, taken in conjunction with the accompanying drawings wherein:

Figure 1 is a general front view (partial longitudinal section) of a multichannel pipette according to 5 the invention; and

Figure 2 shows on an enlarged scale the lower portion of the multichannel pipette (side view, longitudinal section) according to the invention.

The proposed multichannel pipette comprises a casing 1 (Figure 1), its lower end mounting cylindrical members 2 whose internal cavity is in communication with the internal cavity of the casing 1. A lower portion 3 (Figures 1, 2) of each cylindrical member has a tapered external surface. Separable tips 4 are fitted in the 15 tapered lower portion 3 of the cylindrical members 2.

The multichannel pipette forming the subject of the present invention also comprises a strip 5 adapted for removing separable tips and installed on the external surface of the cylindrical members 2 in a manner allowing 20 sliding movement thereof along the cylindrical members 2. The strip 5 has holes 6 (Figure 2) accommodating the cylindrical members 2.

The lower surface of the strip 5 is provided with variable-height projections 7. Each projection 7 is disposed 25 opposite each separable tip 4. In the preferred embodiment of the invention with the cylindrical members 2 arranged in one row, the height of the projections 7 of the strip 5

changes linearly in the direction from the first to the last separable tip 4.

The multichannel pipette according to the invention further includes a strip motion drive comprising rods 8 5 (Figure 1) whose lower ends are secured to the strip 5, a rod 9 loaded vertically with a spring 10 and mounting on its upper end a button 11, and a sleeve 12, the upper ends of the rods 8 being fixed in the lower portion of said sleeve, while the lower end of the rod 9 is fixed 10 in its upper portion.

The rods 8 are fitted in holes 13 in a rectangular projection 14 provided in a lower portion 15 of the casing 1. The rod 9 encompassed by the spring 10 is fitted in a hole 16 in an upper portion 17 of the casing 1.

15 The multichannel pipette according to the invention functions as follows.

On completion of the dosing operation, when the liquid is fully drained from the separable tips 4 (Figure 1) there occurs removal of the separable tips 4. This is 20 done by depressing the button 11 which moves downwards, thereby compressing the spring 10 and setting in motion via the rods 8, 9 the strip 5 adapted for removing the separable tips.

The highest projection 7 (Figure 2) of the strip 5 25 bears against the separable tip 4 disposed opposite the projection 7, thus causing the tip 4 to move from the tapered surface of the cylindrical members 2 to the vessel

for receiving used separable tips (not shown in Figure 1). Thereafter the strip 5 continues to move downwards bearing against the separable tips 4 with its second highest projections 7 whereby the separable tips 4 will be successively thrown off.

The operator releases the button 11 after the last separable tip 4 has been removed. The button 11 moves upwards under the action of the opposing spring 10, thus returning the strip 5 to the initial position.

While the separable tips 4 are successively thrown off, the strip 5 is in contact with one of the separable tips 4 and, in effect, a maximum force applied to the button 11 does not exceed the force required to throw off one separable tip 4. So, maintenance of the proposed multichannel pipette is made easier without introducing unwanted structural complexities.

The present invention permits enhancing efficiency of laboratory work by decreasing fatiguability of operators engaged in repeating many times the procedures of removing used separable tips of multichannel pipettes, another advantage thereof being easier maintenance of the aforesaid pipettes in dosing out corrosive and toxic liquids.



CLAIMS:

1. A multichannel pipette comprising a plurality of pipette members, each having means for carrying a separable tip, tip removing means mounted for movement relative to the members for engaging and displacing the tips to remove the tips from said members, the tip removing means being arranged to engage and remove tips successively from respective members upon operation of said tip removing means.
2. A multichannel pipette comprising a casing; cylindrical members secured to a lower end of the casing, their internal cavity being in communication with the internal cavity of the casing, while their lower portion has a tapered external surface; separable tips fitted hermetically over the tapered external surfaces of the cylindrical members; and a strip adapted for removing the separable tips and installed on the external surface of the cylindrical members in a manner allowing its movement along the cylindrical members, the lower surface of the strip having variable-height projections, each of which is disposed opposite each separable tip.
3. A multichannel pipette as claimed in claim 2 wherein with the cylindrical members arranged in one row the height of the projections of the strip adapted for removing the separable tips linearly changes in the direction from the first to the last separable tip.
4. A multichannel pipette substantially as hereinabove described with reference to, and as shown in the accompanying drawings.

Patents Act 1977

Examiner's report to the Comptroller under section 17 (The Search Report)

Application number

9023405.5

Relevant Technical fields

(i) UK Cl (Edition K) GIB (BCA, BCE, BCJ) BIX

(ii) Int Cl (Edition 5) GO1N, BOIL

Databases (see over)

(i) UK Patent Office

(ii)

ON LINE DATABASES : WPI AND CLAIMS

Search Examiner

M R Wendt

Date of Search

26.11.90

Documents considered relevant following a search in respect of claims

1-4

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
A	GB A 2115719 (DATA) eg. see page 1 lines 123 etc; page 3 lines 102-117; figures	1,2
A	US A 4824642 (COSTAR) eg. see column 2 lines 7-11; column 2 lines 47-50; column 3 lines 25-28; column 7 lines 54-64	1,2
A	US A 4779467 (RAININ) eg. see column 1 lines 53-62; column 9 lines 34-44 and figures	1,2

SF2(p)

TP4ACD

Category	Id ntity of document and relevant passages	Relevant to claim(s)

#### Categories of documents

**X:** Document indicating lack of novelty or of inventive step.

**Y:** Document indicating lack of inventive step if combined with one or more other documents of the same category.

**A:** Document indicating technological background and/or state of the art.

**P:** Document published on or after the declared priority date but before the filing date of the present application.

**E:** Patent document published on or after, but with priority date earlier than, the filing date of the present application.

**&:** Member of the same patent family, corresponding document.

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